

REMARKS

Claims 1, 17-22 and 27-30 are all the claims pending in the application.

Claims 1, 17, 18, 21, 22 and 27 have been rejected under 35 U.S.C. § 102(b) as anticipated by the newly-cited JP 07-230811.

Applicants submit that JP '811 does not disclose the subject matter of the above claims and, accordingly, request withdrawal of this rejection.

Applicants have amended claim 1 to change the term "fibrous carbon" to -- VGCF (vapor grown carbon fiber)--.

Thus, the present invention as set forth in claim 1 as amended above is directed to a fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer, or an assembly for a fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer, characterized in that the gas diffusion layer comprises a layer containing a water repellant resin and a VGCF (vapor grown carbon fiber) formed through heat treatment at a temperature of at least 2000°C, wherein the fibrous carbon has a fiber filament length of 100µm or less and a fiber filament diameter of 100-300 nm, wherein at least part of the surface of the gas diffusion layer is in contact with the catalyst layer.

JP '811 does not disclose the use of VGCF in a gas diffusion layer.

JP '811 discloses a graphite whisker, which is a fine fibrous material made of needle-like crystal. In contrast, the VGFC set forth in claim 1 is an assembly of graphite crystals, not a single crystal. A graphite whisker is solid, but the VGFC is a hollow tube. These facts are known in the art. Therefore, the graphite whisker of JP '811 is essentially different from the VGFC employed in the fuel cell of the present invention as defined in claim 1. Accordingly, JP '811 does not anticipate the subject matter of claim 1.

Turning now to claims 17, 18, 21, 22 and 27, JP '811 discloses a gas-diffusion layer comprising a graphite whisker, but in the present invention as defined in claims 17, 18, 21, 22 and 27, the fibrous carbon is present in the catalyst layer. JP '811 does not disclose the presence of fibrous carbon in the catalyst layer as set forth in claims 17, 18, 21, 22 and 27.

Therefore, JP '811 is essentially different from the inventions set forth in claims 17, 18, 21, 22 and 27, and does not anticipate these claims.

In view of the above, applicants submit that JP '811 does not anticipate the present claims and, accordingly, request withdrawal of this rejection.

Claims 1, 17, 18, 21, 22 and 27 have been rejected under 35 U.S.C. § 103(a) as obvious over JP '811.

Applicants submit that JP '811 does not disclose or render obvious the subject matter of the above claims and, accordingly, request withdrawal of the rejection.

First, with respect to claim 1, applicants point out that in Example 1 of JP '811, the terminal voltage of the electrode evaluated at the current density of $400\text{Ma}/\text{cm}^2$ is 0.52V. See Table 1. In contrast, in Example 5 of the present application in which a VGCF is added to a gas diffusion layer, the terminal voltage of the electrode evaluated at the same current density of $400\text{mA}/\text{cm}^2$ is 0.68V. See Figure 7 of the present specification. Thus, the cell performance of the present invention as defined in claim 1 where VGCF is employed is far greater and significantly better than that of JP '811, and is not suggested by JP '811. Accordingly, applicants submit that JP '811 does not suggest the subject matter of claim 1 or the effects achieved.

Turning now to claims 17, 18, 21, 22 and 28, as discussed above, JP '811 does not teach the use of a fibrous carbon in a catalyst layer. Since JP '811 does not teach the use of a fibrous

carbon in a catalyst layer, JP '811 does not suggest the use of a fibrous carbon in a catalyst layer as set forth in claims 17, 18, 21, 22 and 28. There is no suggestion in JP '811 to employ a fibrous carbon in a catalyst layer.

In view of the above, applicants submit that JP '811 does not disclose or render obvious the subject matter of the above claims and, accordingly, request withdrawal of this rejection.

Claims 19 and 20 have been rejected under 35 U.S.C. § 103(a) as obvious over JP '811 and further in view of U.S. Patent 5,861,222 to Fischer et al.

Claims 19 and 20 are dependent claims that ultimately depend from claim 17. Accordingly, applicants submit that claims 19 and 20 are patentable over JP '811 for the same reasons as discussed above in connection with claim 17.

In view of the above, applicants request withdrawal of this rejection.

Claim 29 has been rejected under 35 U.S.C. § 103(a) as obvious over JP '811 in view of the admitted prior art that is disclosed in the present application, especially Figure 1.

The Examiner states that the difference between the presently claimed invention as set forth in claim 29 and JP '811 is that JP '811 does not appear to clearly disclose providing separators to sandwich the assembly.

The Examiner argues that applicants have admitted in their discussion of Figure 1 that a typical fuel cell contains separator plates which sandwich a membrane-electrode assembly as set forth in claim 29.

Claim 29 is an independent claim that recites the presence of fibrous carbon in the catalyst layer of a fuel cell. As discussed above, JP '811 does not disclose or suggest the presence of fibrous carbon in a catalyst layer.

In view of the above, applicants submit that JP '811 does not disclose or suggest the subject matter of claim 29 and, accordingly, request withdrawal of this rejection.

Claims 29 and 30 have been rejected under 35 U.S.C. § 103(a) as obvious over JP '811 in view of U.S. Patent 6,329,092 to Maeda et al.

In this rejection, the Examiner states at page 18 of the Office Action that the differences between the claimed invention and JP '811 is that JP '811 does not appear to clearly disclose the providing of separators to sandwich the assembly as set forth in claim 29 and does not appear to disclose a fuel battery comprising at least two fuel cells layered together as set forth in claim 30.

The Examiner relies on Maeda et al to show these features.

As discussed above, claim 29 is an independent claim that recites the presence of fibrous carbon in a catalyst layer of a fuel cell. As discussed above, JP '811 does not disclose or suggest the presence of fibrous carbon in a catalyst layer of a fuel cell. Maeda et al do not supply this deficiency. Accordingly, applicants submit that JP '811 and Maeda et al do not render obvious the subject matter of claims 29 and 30.

In view of the above, applicants submit that claims 29 and 30 are patentable over JP '811 and Maeda et al and, accordingly, request withdrawal of this rejection.

Claim 28 has been rejected under 35 U.S.C. § 103(a) as obvious over the newly-cited JP '818 in view of JP '811.

The Examiner asserts that JP '811 discloses all of the features of claim 28, except that JP '818 does not teach the particulars of the claimed fibrous carbon. The Examiner relies on JP '811 to show the use of a fibrous carbon.

Applicants have amended claim 28 to change the term "fibrous carbon" to --VGCF (vapor grown carbon fiber) --.

Thus, claim 28 is directed to a process for producing a layer assembly for a fuel cell, comprising a step for forming a gas diffusion layer by applying a conductive porous substrate onto or immersing the conductive porous substrate in a composition comprising conductive powder particles, a water repellant resin, and VGCF (vapor grown carbon fiber) formed through heat treatment at a temperature of at least 2000°C, wherein the VGCF has a fiber filament length of 100 μm or less and a fiber filament diameter of 100-300 nm, a step for forming an electrode by forming a catalyst layer comprising catalyst-bearing carbon particles on the surface of the gas diffusion layer, the composition being applied onto the surface of the gas diffusion layer or the gas diffusion layer being immersed in the composition, and a step for bonding the catalyst layer of the electrode to each surface of an electrolyte membrane.

JP '811 does not disclose a process for producing a layer assembly for a fuel cell layer by forming a gas diffusion layer containing VGCF.

As discussed above, JP '811 employs graphite whiskers and does not obtain the effects of the present invention achieved by the use of VGCF.

In view of the above, applicants submit that the combination of JP '818 and JP '811 does not disclose or suggest the subject matter of claim 28 and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

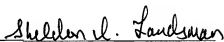
SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

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Sheldon I. Landsman
Registration No. 25,430